

# Ridge to reef fisheries

## Project team

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## Timeframe

2014-2017

## Project description

Clearing of vegetation on land for forestry, farming and mining can cause soils to run-off with rainfall into rivers. Eventually those soils may be carried to the ocean where they can affect ocean life. The people of many island nations depend heavily on ocean resources, like fisheries, so land-use change not only affects ecosystems, but also people's livelihoods.

Our group was tasked with linking actions on land to their impacts in the ocean, to inform better management of land-uses on Pacific Islands. Working with The Nature Conservancy and The Wildlife Conservation Society in Papua New Guinea, Fiji and the Solomon Islands, we accessed existing data-sets on reef fish, ocean habitats and land-uses. We then used statistical modelling to link changes on land to their impacts on ocean life.

We were interested to predict how future changes to land-uses, like protecting some areas from logging, may benefit marine ecosystems and the fisheries they support.

## Outcomes

We quantified the impacts of runoff from logging on coastal fisheries on several Pacific islands. By communicating our science to local stakeholders we helped inspire more effective plans for land-use management and conservation actions to protect forests.

**Solomon Islands:** The bumphead parrotfish (*Bolbometopon muricatum*) is an iconic reef fish species that is highly threatened and is also commercially important for local fisheries in Solomon Islands. We measured a 24 times decline in juveniles of this parrotfish on coral reefs near to logging operations.

Logging causes run-off of sediments that smother critical juvenile habitats. The knowledge that logging was affecting local fisheries helped prevent further logging in Isabel Province that would have damaged reef fish nursery habitat.

The Nature Conservancy communicated this information to local people who decided on action to halt logging in sensitive areas. This discovery has also helped to provide traction for conservation programs aimed at protecting forests adjacent to reef fish nursery grounds, because local landowners are concerned about declines in Bumphead parrotfish.



**Fiji:** The people of Bua Province, Fiji, are currently developing a new plan for land-use change and coastal marine ecosystems in collaboration with the Wildlife Conservation Society. Fiji is home to amazing coral reef ecosystems that also support many people by providing for fisheries. We helped the people of Bua Province find places for forest conservation that would best protect native forests, drinking water supplies and help avoid damaging run-off of sediment to coastal reefs.

We met with local stakeholders in Bua Province, Fiji, to communicate the benefits of land-use management for marine resources. We helped stakeholders better understand the importance of catchment management, and to identify the catchments that are the most critical for protection. We also identified from local participants the location of drinking water catchments, which were not considered by government when they allow logging. This new knowledge will help find win-win solutions to issues like the poor quality drinking water when there is upstream logging and the impacts of eroded sediment on coastal reef ecosystems.

Fiji also suffered from a major cyclone (Cyclone Winston) during the tenure of our working group. The team provided basic spatial information to the Fiji Government (via WCS) on natural resources, including forest cover and catchment boundaries. Providing some information on environmental boundaries was important, to ensure the government considered the cost of the Cyclone not just to built infrastructure, but also to natural capital. This information was used by government to help assess the cost of the cyclone to natural resources.

## Funding

Science for Nature and People Partnership. SNAPP is a collaboration of The Nature Conservancy, the Wildlife Conservation Society and the National Center for Ecological Analysis and Synthesis (NCEAS)

## Partners

Researchers from other universities, including Carissa Klein and Hugh Possingham from the University of Queensland.

Non-governmental organisations: The Nature Conservancy, in particular Richard Hamilton, The Wildlife Conservation Society in particular Sangeeta Mangubhai and Stacy Jupiter

## For more information, contact

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## Publications

Brown CJ, Jupiter S, Lin HY, Albert S, Klein CK, Maina J, Tulloch V, Wenger A, Mumby PJ (In Press) Habitat change mediates the response of coral reef fish populations to terrestrial run-off. *Marine Ecology Progress Series*. <http://www.int-res.com/prepress/m12221.html>

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Hamilton RJ, Almany GR, Brown CJ, Pita J, Peterson NA, Choat JH (2017) Logging degrades nursery habitat for an Iconic coral reef fish. *Biological Conservation*. 2017 210:273-80. <http://www.sciencedirect.com/science/article/pii/S0006320716310461>

Lin HY, Jupiter S, Jenkins, Brown CJ (2017) Impact of anthropogenic disturbances on a diverse riverine fish assemblage predicted by functional traits. *Freshwater Biology* <http://onlinelibrary.wiley.com/doi/10.1111/fwb.12955/full>

Tulloch VJD, Brown CJ, Possingham HP, Jupiter SD, Maina JM, Klein C (2016) Improving conservation outcomes for coral reefs affected by future oil palm development in Papua New Guinea. *Biological Conservation* 203:43-54 <http://www.sciencedirect.com/science/article/pii/S0006320716303160>